WHAT IS CLAIMED IS:

1. A compound semiconductor material for forming an active layer of a thin film transistor device, comprising:

a group II-VI compound doped with a dopant ranging from 0.1 to 30 mol%, wherein the dopant is selected from a group consisting of alkaline-earth metals, group IIIA elements, group IVA elements, group VA elements, group VIA elements, and transitional metals.

2. The compound semiconductor material as claimed in claim 1, wherein the group II-VI compound is ZnO, ZnS, ZnSe, CdSe, CdS, HgS, MnS, SnS, PbS, CoS, NiS, or CdTe.

3. The compound semiconductor material as claimed in claim 1, wherein the alkaline-earth metal is Mg, Ca, Sr, or Ba; the transitional metal is Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Y, Zr, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, La, Hf, Ta, W, Re, Os, Ir, Pt, or Au; the group IIIA element is B, Al, Ga, In, or Tl; the group IVA element is Si, Ge, Sn, or Pb; the group VA element is N, P, As, Sb, or Bi; and the group VIA element is S, Se, Te, or Po.

4. The compound semiconductor material as claimed in claim 1, wherein a precursor solution of the compound semiconductor material is prepared by Chemical Bath Deposition, Photochemical Deposition, or Sol-gel process.

5. The compound semiconductor material as claimed in claim 1, wherein the active layer of the thin film transistor device is patterned by Inkjet Printing, Nanoimprinting, Micro Contact Printing, or a spin coating-photolithography process.

6. The compound semiconductor material as claimed in claim 1, wherein the thin film transistor device is composed of a gate electrode, a source electrode, a drain electrode, a dielectric layer, and a substrate.

7. The compound semiconductor material as claimed in claim 6, wherein the gate electrode, the source electrode, or the drain electrode of the thin film transistor device is made of metals, electrically conductive oxides, or electrically conductive polymers.

8. The compound semiconductor material as claimed in claim 6, wherein the dielectric constant of the dielectric layer is more than 3.

9. The compound semiconductor material as claimed in claim 6, wherein the dielectric layer of the thin film transistor device is made of inorganic materials, polymers, or a material having a high dielectric constant.

10. The compound semiconductor material as claimed in claim 6, wherein the substrate is a silicon wafer, a glass substrate, a quartz substrate, a plastic substrate, or a flexible substrate.

11. A method for forming an active layer of a thin film transistor device, comprising following steps:

(a) providing a precursor solution of a compound semiconductor material;

(b) patterning the precursor solution on a thin film transistor device to form an active layer; and

(c) heating the precursor solution of the active layer on the thin film transistor device to evaporate the solvent in the precursor solution and

to form a group II-VI compound layer doped with a dopant ranging from 0.1 to 30 mol%;

wherein the dopant is selected from a group consisting of alkaline-earth metals, group IIIA elements, group IVA elements, group VA elements, group VIA elements, and transitional metals.

12. The method as claimed in claim 11, wherein the group II-VI compound is ZnO, ZnS, ZnSe, CdSe, CdS, HgS, MnS, SnS, PbS, CoS, NiS, or CdTe.

13. The method as claimed in claim 11, wherein the alkaline-earth metal is Mg, Ca, Sr, or Ba; the transitional metal is Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Y, Zr, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, La, Hf, Ta, W, Re, Os, Ir, Pt, or Au; the group IIIA element is B, Al, Ga, In, or Tl; the group IVA element is Si, Ge, Sn, or Pb; the group VA element is N, P, As, Sb, or Bi; and the group VIA element is S, Se, Te, or Po.

14. The method as claimed in claim 11, wherein the precursor solution of the compound semiconductor material is formulated by Chemical Bath Deposition, Photochemical Deposition, or Sol-gel process in step (a).

15. The method as claimed in claim 11, wherein the patterning of the active layer on the thin film transistor device is carried out by Inkjet Printing, Nanoimprinting, Micro Contact Printing, or a spin coating-photolithography process.